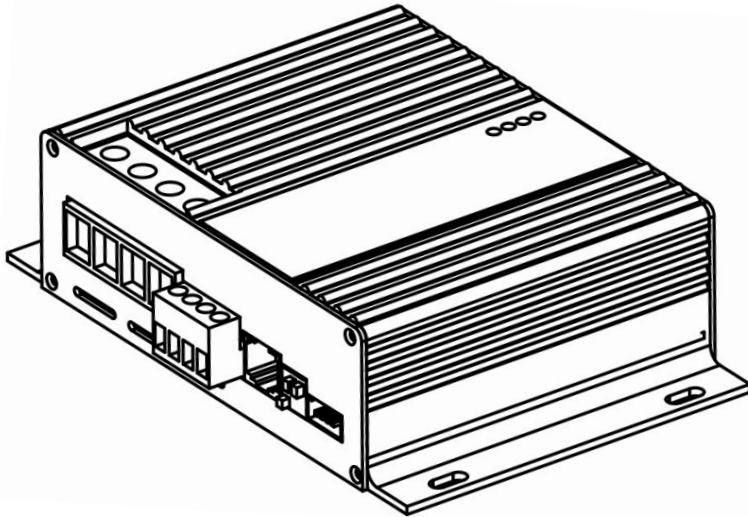


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DC-DC Battery Charger Installation & User Instructions

DX320-12

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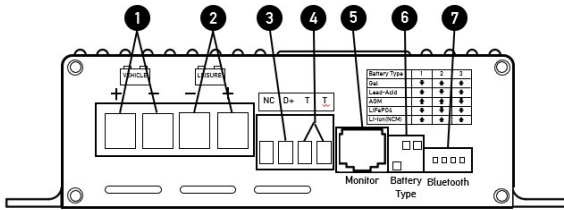
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Overview

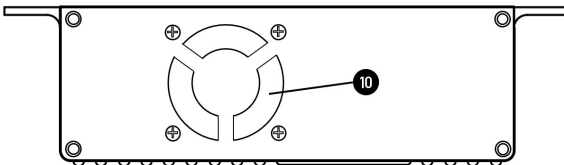
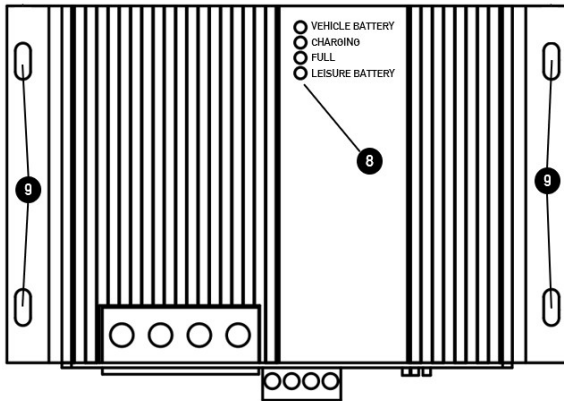
This DC-DC charger provides multi-stage charging of a leisure battery from the vehicle battery. The unit is compatible with smart or traditional alternator types and is able to charge most leisure vehicle batteries.

Key Features

- Selectable charging for Flooded, AGM, Gel & Lithium batteries
- 3-Stage charging profile for fast effective charging
- Fully automatic operation when vehicle is started
- Protected against overheating, overvoltage, short circuit, over-current



1. Vehicle battery inputs
2. Leisure battery outputs
3. Engine running signal (D+)
4. Temperature sensor inputs (optional)
5. Display panel input (not used)
6. Battery type selection switches
7. Bluetooth module input (not used)
8. Charge Status indicators
9. Screw fixing points
10. Cooling fan



Installation

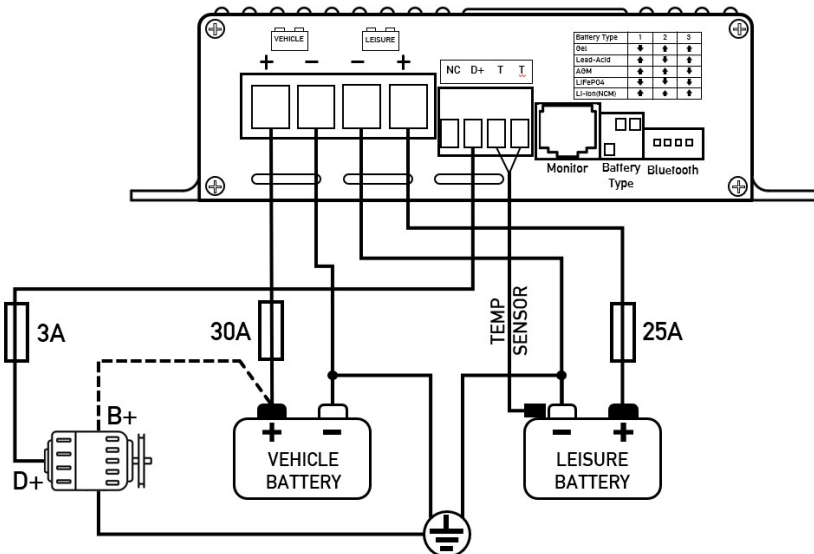
The charger should be installed horizontally or vertically as close to the leisure battery as possible, ensuring the surrounding area is dust free and well ventilated. During operation the chargers cooling fan will exhaust warm air, so ensure there is at least 10cm clear around the charger at all times.

Wiring & Fusing

When fitting, try to keep cabling runs as short as possible and do not underrate, as this will lead to excessive voltage losses and reduced performance. Under full load the charger will draw a large amount of current and the input side will typically draw larger currents than the output by a factor of up to 25%. Please refer to the table to select a suitable wiring gauge, length and recommended fuse rating.

Cable	Up to 3m	Up to 6m	Up to 10m	Fuse
from Vehicle battery	4mm ² 12AWG	6mm ² 10AWG	10mm ² 7AWG	30A
to Leisure battery	3mm ² 13AWG	4mm ² 12AWG	6mm ² 10AWG	25A

Connections



Notes:-

Reverse connection of the battery may blow internal or external fuses and could cause damage to the unit.

Do not overtighten screws or damage to threads may occur. Max recommended torque is 1.2Nm

Engine Running Signal (D+)






The D+ input is used to automatically turn on the charger when the engine is started. Connect a signal wire to the D+ terminal of the vehicles alternator as shown in the diagram. On vehicles with smart alternators it may not be possible to connect directly to the alternator, in which case consult the vehicle manufacturer for a suitable location. Alternatively the D+ input may be connected to a switched ignition circuit. Note:- If using this method care must be taken, as leaving the ignition in the On position with the engine Off may result in over discharge of the vehicle battery.

Temperature Sensor (optional)

With the optional temperature sensor fitted, the charger can adjust the rate of charge, depending on the ambient temperature. For example in winter the charge rate will be increased and in summer it will be reduced. It is recommended to install the sensor on the negative terminal of the Leisure battery or on the battery casing. Note:- The unit will use a default setting if the temperature sensor is not fitted.

Battery Selection

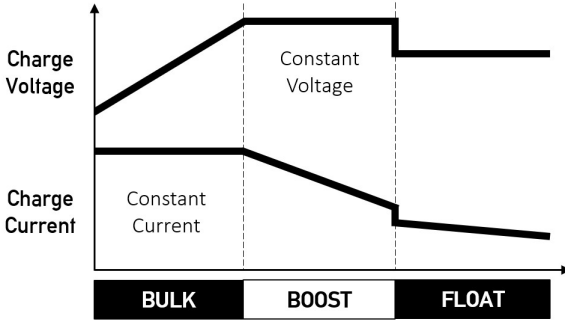
Before using the charger, ensure the correct battery type has been set using the selector switches.

Setting	Battery Type
	Gel
	Lead Acid
	AGM
	LiFePO ₄
	Lithium Ion

Note:- If an invalid selection is chosen, all status indicators on the unit will flash.

Charging profile

Depending on the battery type selected, the 3-stage charging profile will be adjusted to maximise charging performance.



BULK The battery is charged with maximum current, whilst the voltage climbs steadily, until the boost voltage setting is reached.

BOOST The battery voltage is held constant while the current gradually decreases, until the battery is becoming full. By default the boost stage will not exceed 2 hours to prevent overcharging.

FLOAT The voltage of the battery will reduce to the float voltage setting and current will reduce to a trickle charge to help offset any self-discharge.

The following table shows voltages used for each battery type setting

Battery Type	Gel	Lead Acid	AGM	LiFePO ₄	Lithium Ion
Equalize charge	-	14.6V	14.8V	-	-
Boost charge	14.3V	14.4V	14.7V	14.4V	12.6V
Float charge	13.8V	13.5V	13.5V	13.8V	12.5V
Over voltage protect	15.5V	15.5V	15.5V	15.5V	13.5V
Low voltage alarm	11.0V	11.0V	11.0V	11.0V	9.3V
Boost charge time	2hrs	2hrs	2hrs	2hrs	2hrs
Safety charging volts	12.8V	12.8V	12.8V	13.0V	12.0V
High voltage recover	13.7V	13.7V	13.7V	14.8V	12.8V
Boost voltage recover	13.2V	13.2V	13.2V	13.2V	12.0V

Operation

Indicators

During charging, indicators on top of the unit will show the current mode of operation, as shown in the following table

Indicator	Flashing	Status
Vehicle Battery	Off Slow Fast On	No D+ signal detected, charger is Off Vehicle battery voltage < 11.5V Vehicle battery voltage > 16V Vehicle battery voltage is normal
Charging	Off Slow Fast On	No charging Battery temperature too high or lithium temperature too low Charger has overheated Charging is normal
Full	Off Slow Fast On	No charging Bulk charging stage Boost charging stage Float charging stage (Fully charged)
Leisure Battery	Slow Fast On	Leisure battery voltage is normal Leisure battery voltage is high Leisure battery voltage is low
All	Fast	Battery selection error

Note:- During power-on, all indicators will flash for 1 second then go out to confirm correct operation.

Power Derating

If the vehicle battery voltage becomes low, the output current will be reduced to avoid over discharge and vehicle starting problems.

Vehicle battery voltage	Charge Current	Recovery Voltage	Charge Current
> 12.6V	20A	-	-
< 11.9V	17A	> 12.25V	20A
< 11.7V	13.5A	> 12.1V	17A
< 11.5V	10A	> 12.0V	13.5A
< 11.2V	Stop charging	> 12.6V	20A

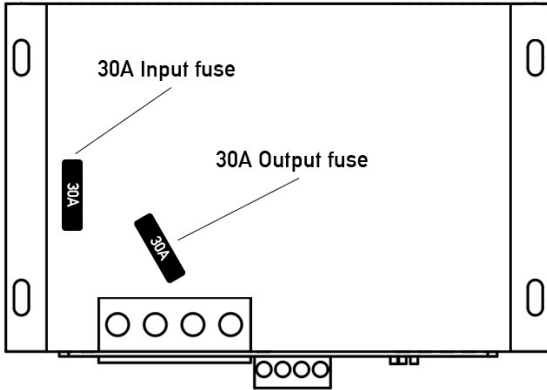
Note:- If the vehicle battery voltage falls below 11.2V then charging will be stopped until the battery is recharged above 12.6V

Protection

If there is a problem during charging, the unit will sound an alarm and may also shut down to protect itself. The following table shows the various protection modes.

Protection	Error	Action
Leisure Battery over voltage	1. Battery voltage > Over voltage protect 2. Battery voltage > boost voltage +0.2V	Turn off charging and sound alarm for 1 minute
Leisure Battery low voltage	Battery voltage < Low voltage alarm	Sound alarm for 1 minute
Vehicle Battery low voltage	1. Battery voltage 11.5 - 11.2V 2. Battery voltage < 11.2V	1. Reduce current to 10A 2. Turn off charging
Over load	Battery current > 20A	Current limited to 20A
Reverse polarity	Battery connections reversed	Internal or external fuse blows *
Over Temperature	1. Temperature > 80°C 2. Temperature > 85°C	1. Reduce max current until temp < 65°C then resume at 20A 2. Turn off charging until temp < 60°C then resume charging

* - If an internal fuse blows, it can be replaced by removing the top cover. To do this unscrew the uppermost 2 x screws on each endplate and the top cover can then be removed.



IMPORTANT - If the unit is connected with reverse polarity, internal components may be damaged. In this case, the unit should be checked by a technician before re-connecting in the vehicle.

Specification

Model	DX320-12
Battery types	Gel. Lead acid, AGM, LiFePO ₄ , Lithium (NCM)
Leisure Battery voltage range	8 - 16V
Battery capacity	30 - 180Ah
Vehicle Battery voltage range	10.5 - 15.4V
Power (max)	260W
Current (max)	20A
D+ signal voltage range	8 - 16V
Temperature compensation	-3mV/°C
Standby current	17mA (max)
Weight	0.46kg
Dimensions	147 x 118 x 41mm
Operating temperature	-20 - 50°C

Notes

Notes



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